Title: THE CHEMICAL NATURE OF ASPARTIC ACID DECARBOXYLASE (USSR)

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THE CHEMICAL NATURE OF ASPARTIC ACID DECARBOXYLASE

S. R. Mardahaev and R. N. Etingof,
Chair of Biochemistry,
First Moscow Medical Institute

[A Digest]

A culture of Pseudo Mycobacterium n. sp. which had been isolated in our laboratory exhibits a specific decarboxylating action on l-aspartic acid [1] This property has been utilized for the quantitative determination of l-aspartic acid in proteins. Experiments on derivatives of aspartic acid, in the course of which the effects exerted on decarboxylation by the carboxyl group and the alpha - amino group have been clarified, were also carried out [2].

The culture of the bacterium was grown in a solid medium [2]. Aspartic acid decarboxylase was extracted with an M/45 borate buffer at p_H = 10.5. During the extraction the p_H of the solution dropped considerably. An active centrifugate was dialyzed with distilled water, whereupon complete inactivation of the extract took place. The inactive dialyzed extract could be reactivated by adding a boiled solution of aspartic acid decarboxylase, which means that no decomposition of the apoenzyme occurred as a result of the dialysis. In other words, dialysis represents a satisfactory method for the separation ~~of other words, dialysis represents a satisfactory method for the separation~~ of the enzyme into the apoenzyme and the coenzyme. Furthermore, the inactivated dialyzed extract can be reactivated by adding either a boiled yeast extract or a boiled solution of lysine decarboxylase or arginine decarboxylase. This means that the active group of the enzyme is identical in all three decarboxylases. In view of the fact that the coenzyme of lysine decarboxylase and arginine decarboxylase is known to be pyridoxal phosphate, pyridoxal phosphate must also be assumed to be the active group of aspartic acid decarboxylase.

When the bacterial culture develops under conditions that are unfavorable as far as the synthesis of aspartic acid decarboxylase is concerned, pyridoxal phosphate does not form, while the synthesis of the aspartic acid decarboxylase apoenzyme, although reduced in volume, proceeds to completion.

The inactive apoenzyme which is obtained from such cultures can be activated by means of solutions containing pyridoxal phosphate. These solutions may be prepared from yeast, lysine decarboxylase, or tyrosine decarboxylase.

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Title: NEW DATA ON THE PREPARATION OF BACTERIAL DECARBOXYLASES OF AMINO ACIDS (USSR)

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NEW DATA ON THE PREPARATION OF BACTERIAL DECARBOXYLASES OF AMINO ACIDS

S. R. Mardashev and R. N. Etingof
Chair of Biochemistry, First Moscow Medical Institute

/A Digest/

The use of bacterial decarboxylases for the determination of amino acids has found wide acceptance at present. The number of amino acids which can be determined by this method constantly grows /1/. In order to obtain better yields of the required decarboxylases, it is advisable to cultivate the microorganisms in 2% solid agar media instead of broths. Lysine and arginine decarboxylases are obtained by this method in a quantity which permits to make five times more determinations. The improvement of the yield of tyrosine decarboxylase is not quite so great, however.

In the series of experiments carried out in this instance, a medium of the following composition was used:

Aqueous meat extract	5 volume %
Casein hydrolysate treated with trypsin	0.5%
NaCl	2%
Dextrose	2%
Agar	1 volume %
Autolysate of baker's yeast	

For the preparation of lysine decarboxylase, B. cadaveris N. C. T. C. 6578 was used, for the preparation of arginine decarboxylase, E. coli 7020, and for the preparation of tyrosine decarboxylase, S. faecalis N. C. T. C. 6782. The use of yeast autolysate is necessary only in the case of S. faecalis.

The maximum arginine decarboxylase activity is obtained by incubating E. coli on agar for 48 hours. For the tyrosine decarboxylase, the optimum incubation period of S. faecalis is 16 ÷ 24 hours. The lysine decarboxylase activity is not diminished even after incubation of B. cadaveris for 72 hours.

In preparing the decarboxylases, the water suspension of the bacteria gathered from the agar cultures was treated with acetone, and the precipitate collected on a Buechner funnel. Contrary to the findings of Taylor and Gale [2, 3] acetone does not destroy the glutamic acid decarboxylase activity contained in Cl. welchii SR-12 and in Cl. welchii BW-21. A separation of histidine decarboxylase of Cl. welchii BW-21 from glutamic acid decarboxylase of the same microorganism can be effected by means of dioxane, because this solvent specifically inactivates glutatamic acid decarboxylase, leaving the activity of the histidine decarboxylase unimpaired.

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